SCIENCE

NEW YORK, NOVEMBER 6, 1891.

THE SUN'S MOTION IN SPACE.[1]

SCIENCE needed two thousand years to disentangle the earth's orbital movement from the revolutions of the other planets, and the incomparably more arduous problem of distinguishing the solar share in the confused multitude of stellar displacements first presented itself as possibly tractable little more than a century ago. In the lack for it as yet of a definite solution there is, then, no ground for surprise, but much for satisfaction in the large measure of success attending the strenuous attacks of which it has so often been made the object.

Approximately correct knowledge as to the direction and velocity of the sun's translation is indispensable to a profitable study of sidereal construction; but, apart from some acquaintance with the nature of sidereal construction, it is difficult, if not impossible, of attainment. One, in fact, presupposes the other. To separate a common element of motion from the heterogeneous shiftings upon the sphere of three or four thousand stars is a task practicable only under certain conditions. To begin with, the proper motions investigated must be established with *general* exactitude. The errors inevitably affecting them must be such as pretty nearly, in the total upshot, to neutralize one another. For should they run mainly in one direction, the result will be falsified in a degree enormously disproportionate to their magnitude. The adoption, for instance, of a system of declinations as much as 1″ of arc astray, might displace to the extent of 10° north or south the point fixed upon as the apex of the sun's way (see L. Boss, Astr. Jour., No. 213). Risks on this score, however, will become less formidable, with the further advance of practical astronomy along a track definable as an asymptote to the curve of ideal perfection.

Besides this obstacle to be overcome, there is another which it will soon be possible to evade. Hitherto, inquiries into the solar movement have been hampered by the necessity for preliminary assumptions of some kind as to the relative distances of classes of stars. But all such assumptions, especially when applied to selected lists, are highly insecure; and any fabric reared upon them must be considered to stand upon treacherous ground. The spectrographic method, however, here fortunately comes into play. "Proper motions" are only angular velocities. They tell nothing as to the value of the perspective element they may be supposed to include, or as to the real rate of going of the bodies they are attributed to, until the size of the sphere upon which they are measured has been otherwise ascertained. But the displacements of lines in stellar spectra give directly the actual velocities relative to the earth of the observed stars. The question of their distances is, therefore, at once eliminated. Now the radial component of stellar motion is mixed up, precisely in the same way as the tangential component, with the solar movement; and since complete knowledge of it, in a sufficient number of cases, is rapidly becoming accessible, while knowledge of tangential velocity must for a long time remain partial or uncertain, the advantage of replacing the discussion of proper motions by that of motions in line of sight is obvious and immediate. And the admirable work carried on at Potsdam during the last three years will soon afford the means of doing so in the first, if only a preliminary investigation of the solar translation based upon measurements of photographed stellar spectra.

The difficulties, then, caused either by inaccuracies in star-catalogues or by ignorance of star-distances, may be overcome; but there is a third, impossible at present to be surmounted, and not without misgiving to be passed by. All inquiries upon the subject of the advance of our system through space start with an hypothesis most unlikely to be true. The method uniformly adopted in them — and no other is available — is to treat the *inherent* motions of the stars (their so-called *motus peculiares*) as pursued indifferently in all directions. The steady drift extricable from them by rules founded upon the science of probabilities is presumed to be solar motion visually transferred to them in proportions varying with their remoteness in space, and their situations on the sphere. If this presumption be in any degree baseless, the result of the inquiry is *pro tanto* falsified. Unless the deviations from the parallactic line of the stellar motions balance one another on the whole, their discussion may easily be as fruitless as that of observations tainted with systematic errors. It is scarcely, however, doubtful that law, and not chance, governs the sidereal revolutions. The point open to question is whether the workings of law may not be so exceedingly intricate as to produce a grand sum total of results which, from the geometrical side, may justifiably be regarded as casual.

The search for evidence of a general plan in the wanderings of the stars over the face of the sky has so far proved fruitless. Local concert can be traced, but no widely-diffused preference for one direction over any other makes itself definitely felt. Some regard, nevertheless, *must* be paid by them to the plane of the Milky Way, since it is altogether incredible that the actual construction of the heavens is without dependence upon the method of their revolutions.

The apparent anomaly vanishes upon the consideration of the profundities of space and time in which the fundamental design of the sidereal universe lies buried. Its composition out of an indefinite number of partial systems is more than probable; but the inconceivable leisureliness with which their mutual relations develop renders the harmony of those relations inappreciable by short-lived terrestrial denizens. "Proper motions," if this be so, are of a subordinate kind; they are indexes simply to the mechanism of particular aggregations, and have no definable connection with the mechanism of the whole. No considerable error may then be involved in treating them, for purposes of calculation, as indifferently directed; and the elicited solar movement may genuinely represent the displacement of our system relative to its more immediate stellar environment. This is perhaps the utmost to be hoped for until sidereal astronomy has reached another stadium of progress, unless, indeed, effect should be given to Clerk Maxwell's suggestion for deriving

[1] A. M. Clerke in Nature of Oct. 15.

the absolute longitude of the solar apex from observations of the eclipses of Jupiter's satellites (Proc. Roy. Soc., vol. xxx. p. 109). But this is far from likely.

In the first place, the revolutions of the Jovian system cannot be predicted with anything like the required accuracy. In the second place, there is no certainty that the postulated phenomena have any real existence. If, however, it be safe to assume that the solar system, cutting its way through space, virtually raises an ethereal counter-current, and if it be further granted that light travels faster with than against such a current, then indeed it becomes speculatively possible, through slight alternate accelerations and retardations of eclipses taking place respectively ahead of and in the wake of the sun, to determine his absolute path in space as projected upon the ecliptic. That is to say, the longitude of the apex could be deduced together with the resolved part of the solar velocity; the latitude of the apex, as well as the component of velocity perpendicular to the plane of the ecliptic, remaining, however, unknown.

The beaten track, meanwhile, has conducted two recent inquiries to results of some interest. The chief aim of each was the detection of systematic peculiarities in the motions of stellar assemblages after the subtraction from them of their common perspective element. By varying the materials and method of analysis, Professor Lewis Boss, director of the Albany Observatory, hopes that corresponding variations in the upshot may betray a significant character. Thus, if stars selected on different principles give notably and consistently different results, the cause of the difference may with some show of reason be supposed to reside in specialities of movement appertaining to the several groups. Professor Boss broke ground in this direction by investigating 284 proper motions, few of which had been similarly employed before (Astr. Jour., No. 213). They were all taken from an equatorial zone 4° 20′ in breadth, with a mean declination of + 3°, observed at Albany for the catalogue of the Astronomische Gesellschaft, and furnished data accordingly for a virtually independent research of a somewhat distinctive kind. It was carried out to three separate conclusions. Setting aside five stars with secular movements ranging above 100″, Professor Boss divided the 279 left available into two sets — one of 135 stars brighter, the other of 144 stars fainter, than the eighth magnitude. The first collection gave for the goal of solar translation a point about 4° north of α Lyræ, in R.A. 280°, Decl. + 43°; the second, one some thirty-seven minutes of time to the west of δ Cygni, in R.A. 286°, Decl. + 45°. For a third and final solution, twenty-six stars moving 40″–100″ were rejected, and the remaining 253 classed in a single series. The upshot of their discussion was to shift the apex of movement to R.A. 289°, Decl. + 51°. So far as the difference from the previous pair of results is capable of interpretation, it would seem to imply a predominant set towards the north-east of the twenty-six swifter motions subsequently dismissed as prejudicial, but in truth the data employed were not accurate enough to warrant so definite an inference. The Albany proper motions, as Professor Boss was careful to explain, depend for the most part upon the right ascensions of Bessel's and Lalande's zones, and are hence subject to large errors. Their study must be regarded as suggestive rather than decisive.

A better quality and a larger quantity of material was disposed of by the latest and perhaps the most laborious investigator of this intricate problem. M. Oscar Stumpe of Bonn (Astr. Nach., Nos. 2999, 3000) took his stars, to the number of 1,054, from various quarters, if chiefly from Auwers's and Argelander's lists, critically testing, however, the movement attributed to each of not less than 16″ a century. This he fixed as the limit of secure determination, unless for stars observed with exceptional constancy and care. His discussion of them is instructive in more ways than one. Adopting (the additional computative burden imposed by it notwithstanding) Schönfeld's modification of Airy's formulæ, he introduced into his equations a fifth unknown quantity expressive of a possible stellar drift in galactic longitude. A negative result was obtained. No symptom came to light of "rotation" in the plane of the Milky Way.

M. Stumpe's intrepid industry was further shown in his disregard of customary "scamping" subterfuges. Expedients for abbreviation vainly spread their allurements; every one of his 2,108 equations was separately and resolutely solved. A more important innovation was his substitution of proper motion for magnitude as a criterion of remoteness. Dividing his stars on this principle into four groups, he obtained an apex for the sun's translation corresponding to each as follows: —

Group.	Number of included stars.	Proper motion.	Apex.		
		″ ″	°		°
I.	551	0.16 to 0.32	R.A. 287.4	Decl. +	42
II.	340	0.32 to 0.64	" 279.7	"	40.5
III.	105	0.64 to 1.28	" 287.9	"	32.1
IV.	58	1 28 and upwards	" 285.2	"	30.4

Here, again, we find a marked and progressive descent of the apex towards the equator with the increasing swiftness of the objects serving for its determination, leading to the suspicion that the most northerly may be the most genuine position, because the one least affected by stellar individualities of movement. By nearly all recent investigations, moreover, the solar *point de mire* has been placed considerably further to the east and nearer to the Milky Way than seemed admissible to their predecessors, so that the constellation Lyra may now be said to have a stronger claim than Hercules to include it; and the necessity has almost disappeared for attributing to the solar orbit a high inclination to the medial galactic plane.

From both the Albany and the Bonn discussions, there emerged with singular clearness a highly significant relation. The mean magnitudes of the two groups into which Professor Boss divided his 279 stars, were respectively 6.6 and 8.6, the corresponding mean proper motions 21.9″ and 20.9″. In other words, a set of stars on the whole six times brighter than another set owned a scarcely larger sum-total of apparent displacement. And that this approximate equality of movement really denoted approximate equality of mean distance was made manifest by the further circumstance that the secular journey of the sun proved to subtend nearly the same angle whichever of the groups was made the standpoint for its survey. Indeed, the fainter collection actually gave the larger angle (13.73″ as against 12.39″), and so far an indication that the stars composing it were, on an average, nearer to the earth than the much brighter ones considered apart.

A result similar in character was reached by M. Stumpe. Between the mobility of his star groups and the values derived from them for the angular movement of the sun the conformity proved so close as materially to strengthen the inference that apparent movement measures real distance The mean brilliancy of his classified stars seemed, on the contrary, quite independent of their mobility. Indeed, its changes tended in an opposite direction. The mean magnitude of the slowest group was 6.0, of the swiftest 6.5, of the

intermediate pair 6.7 and 6.1. And these are not isolated facts. Comparisons of the same kind, and leading to identical conclusions, were made by Professor Eastman at Washington in 1889 (Phil. Society Bulletin, vol. xi., p. 143; Proceedings Amer. Association, 1889, p. 71).

What meaning can we attribute to them? Uncritically considered, they seem to assert two things, one reasonable, the other palpably absurd. The first — that the average angular velocity of the stars varies inversely with their distance from ourselves — few will be disposed to doubt; the second — that their average apparent lustre has nothing to do with greater or less remoteness — few will be disposed to admit. But, in order to interpret truly, well-ascertained if unexpected relationships, we must remember that the sensibly moving stars used to determine the solar translation are chosen from a multitude sensibly fixed; and that the proportion of stationary to travelling stars rises rapidly with descent down the scale of magnitude. Hence a mean struck in disregard of the zeros is totally misleading; while the account is no sooner made exhaustive than its anomalous character becomes largely modified. Yet it does not wholly disappear. There is some warrant for it in nature. And its warrant may perhaps consist in a preponderance, among suns endowed with high physical speed, of small, or slightly luminous, over powerfully radiative bodies. Why this should be so, it would be futile, even by conjecture, to attempt to explain.

AN INGENIOUS FORGING PRESS.

MR W. D. ALLEN, in a paper read at the autumn meeting of the Iron and Steel Institute, London, in October (Nature, Oct. 15), described a forging press, which, although it has been at work for some years at the Bessemer Works in Sheffield, is so ingenious, and so new to most people, that it is worthy of description. The press has the appearance of a steam hammer, and, indeed, there is a steam cylinder at the top, just as in a hammer. The use of the steam, however, is only to raise the "tup" when the hydraulic pressure is released. The press consists of an anvil block below and a ram above, the work being in a vertical direction. The ram works in a hydraulic cylinder, and is carried through the top end of the latter in the shape of a stout shaft or shank, which may be described as a tail-rod to the ram. Attached to this is the piston rod of the steam piston, the latter, of course, working in its own cylinder. The steam cylinder and hydraulic cylinder are therefore placed tandemwise, the latter being underneath. The hydraulic cylinder is supplied with water at pressure by a suitable pump, the barrel of the pump being in direct communication with the hydraulic cylinder, there being no valve of any kind between the two.

If we have made our explanation clear, it will be seen that the ram will descend and ascend stroke for stroke with the pump plunger (the same water flowing backwards and forwards continuously), it being remembered that the steam cylinder has always a tendency to lift the ram. Thus, upon the pump making a forward stroke, the water in its barrel is forced into the hydraulic cylinder; the ram is thus forced down, and gives the necessary squeeze to the work on the anvil. The pump plunger then starts on its return stroke, and so, by enlarging the space in the pump barrel, enables the hydraulic ram to rise and press the water out of the cylinder and back into the pump. The rising of the ram is caused by the lifting action of the steam under the piston; the atter, it will be remembered, being attached to the ram. Of course the water pressure is sufficient to overcome the steam pressure on the downward stroke.

The chief use of this press is to produce work of any given thicknesses within the range of the machine. This end is attained by regulating the volume of water used. The action may be explained as follows. We will suppose, merely for simplicity sake, the contents of the pump barrel to be one cubic foot, and that of the hydraulic cylinder, when the ram is at the full extent of its stroke, to be two cubic feet. We will neglect the connecting pipe between the two, as that is not a variable and does not affect the principle. If there be admitted to the pump but one cubic foot of water as the plunger moves forward, it will drive all this water (omitting clearance) into the hydraulic cylinder, and the ram would therefore only descend one-half its stroke. If the stroke were two feet the travel would be twelve inches, whilst there would be twelve inches of space between the anvil and the lower side of the squeezing tool on the end of the ram. Objects of twelve inches, or above twelve inches in thickness, could therefore be forged. If, however, an article six inches thick had to be worked, another half cubic foot of water would have to be admitted. As the pump barrel would only accommodate one cubic foot of water, the extra half cubic foot would remain permanently in the hydraulic cylinder, and the ram would therefore not go, by six inches, to the top of its stroke; in other words, the traverse of the ram would be carried six inches nearer the anvil.

It will be remembered that the upward movement of the ram is effected by the steam cylinder, which is powerful enough to lift the dead weight of the ram, but is overcome by the hydraulic pressure. It will be seen that by regulating the volume of water in the machine, the ram — although always making the same length of stroke — can be kept working at any given distance from the anvil: the ram and pump-plunger making stroke for stroke as the water flows backwards and forwards between the barrel of the pump and hydraulic cylinder. The device is no less important than ingenious. In ordinary forging, reliance has to be placed for accuracy of work on the skill of the workman. It is surprising how near perfection a good forgeman will arrive by constant practice. Such men are necessarily scarce, and as a consequence very highly paid, but even the nearest approximation of eye and hastily applied callipers, with the chance of getting a little too much work on at the last minute, cannot equal the absolutely correct results of this automatic system.

ASTRONOMICAL NOTES.

The Rev. T. E. Espin has found two new variable stars in Cygnus, viz., D. M. + 36°, 3852, and D. M. + 49°, 3239. They are both of a strong red color.

The Harvard College Observatory has just issued a paper entitled "Preparation and Discussion of the Draper Catalogue." The introduction to the volume contains reference to the gift of Mrs. Draper of the funds by which the work has been carried on, and also a description of the instrument with which the photographs were taken. Then follows a catalogue of the spectra of the stars. The plates were exposed in the years 1886 and 1887.

In the Proceedings of the Irish Academy (vol. 4, No. 4, third series) Mr. J. E. Gore has a very interesting paper entitled "A Catalogue of Binary Stars for which Orbits have been Computed." The catalogue contains 59 stars, giving the name of each star, its approximate position for the epoch 1890.0, the elements, by whom computed, magnitude of com-

ponents, color of components, their spectra, the "hypothetical parallax,"— for the process of computing reference should be made to Mr. Gore's article,— and the most recent parallax of the star as determined by observation. Mention is also made of the publication in which the elements first appeared. The notes following the catalogue are very complete, and will be found very useful to those interested in this particular branch of astronomy.

In another paper read before the same society, Mr. Gore gives his observations of the variable star μ Cephei. He finds that the variation of light for this star does not exceed half a magnitude, and is very irregular, the star sometimes remains for several months with little or no change in its brightness. Mr. Gore, in a third paper, gives the orbit of the double star 35 ι Comae Berenices. The magnitudes of the components are 5 and 7.8 respectively. He has found for this pair of stars a period of 228.4 years. He has computed the elements, and from this has derived the position angles and distance between the stars from Struve's first measurement in 1829 to Burnham's last measurement, made in 1891. The residuals betweeen the computed and observed position angles are quite small, and with one or two exceptions the computed and observed distances compare very favorably.

EXPERIMENTAL DIPHTHERIA.[1]

PROFESSOR WELCH and Dr. Flexner present a preliminary account of the results of their study of experimental diphtheria in guinea-pigs, rabbits, and kittens. They employed in their experiments pure cultures of the Klebs-Lœffler diphtheritic bacillus, which they inoculated into the trachea and under the skin of these animals. The study which they made was directed particularly to the changes in the tissues produced by these organisms. Previous observers had not confirmed fully the results obtained by Oertel in his study of the alterations in the tissues in human diphtheria, and hence an important factor in the causation of the disease was missing. Drs. Welch and Flexner found that the lesions described by Oertel in human diphtheria are also present in the tissues of animals dead of the experimental disease, and in addition they describe a number of lesions which have not been found up to this time in the disease in human beings. They produced at the seat of inoculation a false membrane, in which the bacilli multiplied. The bacilli remain in the local process; they never invade the blood and tissues of either animal or man, and the general effects are caused, not by the bacilli themselves, but by a poison which they produce.

As in human diphtheria the place of entrance of the poison and the contiguous parts show the greatest destruction, so also in animals the seat of inoculation and the neighboring lymphatic glands exhibit the gravest changes; and, further, as is the case in human diphtheria, distant organs are affected, so is it in the experimental form of the disease. These observers found lesions in the seat of inoculation and adjacent tissues of the most intense nature, in the heart, lungs, liver, kidneys, adrenals, thyroid gland, the epithelium and lymphatic apparatus of the intestinal tract, and in all of the lymphatic glands of the body. The lesions described consist of death of cells, shown by the extensive nuclear fragmentation that has taken place, the affected cells being converted often into a substance resembling fibrin; a hyaline death of cells which occurs in the liver and adrenals especially, and the production of intense fatty degeneration of the muscle of the heart, the epithelium of the kidneys and liver. Hence, a valuable link is added to the chain of evidence that the cause of human diphtheria is a specific organism — the Klebs-Lœffler diphtheritic bacillus.

[1] The Histological Changes in Experimental Diphtheria. Preliminary communication. By William H. Welch, M.D., professor of pathology and Simon Flexner, M.D., fellow in pathology. The Johns Hospital Bulletin, No. 15, August, 1891.

NOTES AND NEWS.

A KIND of artificial honey which has lately been produced seems likely to become a formidable rival of natural honey. It is called "sugar honey," and consists of water, sugar, a small proportion of mineral salts, and a free acid; and the taste and smell resemble those of the genuine article. Herr T. Weigle brought the subject before a recent meeting of the Bavarian Association of the Representatives of Applied Chemistry, and there is a paragraph about it in a recent number of the *Board of Trade Journal*.

— It is stated in *Nature* that a cat born with only two legs (the fore-legs being absent from the shoulder-blades) has been recently described by Professor Leon of Jassy (Naturw. Rundsch.). It is healthy, and goes about easily, the body in normal position. When startled, or watching anything, it raises itself to the attitude of a kangaroo, using the tail as a support. This animal has twice borne kittens, in both cases two, one of which had four feet, the other only two.

— Hysteria in men is apparently not rare in other countries, but in England, according to the *British Medical Journal*, it is, relatively speaking, very uncommon. Not many years ago a Russian physician observed that true hysterical fits were common among young Circassian men, and the disease might reasonably be suspected to prevail where men of an imaginative and impressionable stock predominate. Judging by the evidence of French medical publications, Frenchmen are far more subject to hysteria in adult life than Englishmen. Occasionally certain cases recorded in French medical newspapers must cause us to reflect; are such cases hysterical at all, or are certain nervous affections common in England really forms of hysteria? The doctrine that hypochondria is in males the homologue of hysteria, must be accepted by the French on the evidence of what prevails in England. For hypochondria, low spirits, or "spleen," is proverbially common there, and the French hold exaggerated opinions on the subject. In a more excitable race, more acute nervous symptoms might be expected.

— Rats at Aden appear to have a vigorous appetite, and to adopt remarkable ways of gratifying it. Captain R. Light, writing on the subject from Aden to the Journal of the Bombay Natural History Society (from which *Nature* quotes), says the rats in his house — which is overrun with them — demolish skins, braces, whips, etc.; and one night he awoke, feeling a rat gnawing at his toes. This happened in spite of a dog (a good ratter) being in the room. Captain Light was lately watching his pony being shod, and noticed the hoof apparently cut away all round the coronet, wherever it was soft. He accused the "nalband" of doing this in addition to the usual rasping of the hoof to suit the shoe. The "syce" said that the rats had done it, and that they came at night and ate away not only the pony's hoofs but those of the goat and kid, and that these animals were greatly tormented by the rats. Captain Light examined the hoofs, and found beyond doubt that such was the case, the marks of the teeth being plain; moreover, he found that the horns of the kid, which had been about half an inch high, were eaten flush with the head. Next morning, too, a large rat was discovered in the bedding under the horse. It had evidently been killed by a kick from him.

— The mareograph in the harbor of Pola, according to Lieut. Gratzl (Met. Zeitsch.), often shows, in addition to the ordinary tidal curve, certain more or less regular oscillations, generally with a period of about fifteen minutes (some with one of seven minutes). According to *Nature*, these appear to be of the nature of *seiches*, and to be caused by squalls, which drive water from the open sea into the partly inclosed basin of the harbor, where it rises as a wave, retires, rises again to a less height (as only part of

the surplus water escapes), and so on. Thus, in the evening of July 6, 1890, after a stiff west-north-west squall, there were eight pronounced oscillations, the strongest showing about 1.4 inches difference of level in sixteen minutes. In another case, the harbor level rose higher than it had done for fifteen years. The latter squall (a strong south-west one) affected also the Trieste mareograph, which showed nine wide oscillations with a mean period of one hour forty-six minutes. Lieut. Gratzl suggests observations as to whether sudden impulses of "bora" against the Italian coast might not heap up the water there, so that a return wave might affect the Austrian mareographs; also whether certain sudden currents which injure fishermen's nets in the Dalmatian canals may not be connected with those waves.

— Last winter there were some reports, says *Nature*, that sunset phenomena had greatly increased in brilliancy, as if something similar to the optical disturbance following the Krakatoa eruption had occurred. Herr Busch has remarked (Met. Zeit.) how difficult it is to recognize gradual variations in such phenomena, or to say where they pass beyond the normal. Even the brown-red Bishop's ring may be regarded as quite normal in winter. A much more sure method of finding an optical disturbance of the atmosphere is measurement of the polarization of light. Herr Busch has carried this on systematically for some years with a Savart polariscope, and a simple instrument for measuring angles, determining the height of the two neutral points (Babinet's and Arago's) at sunset. Now, the values for this height, in February and May last, considerably exceed those obtained in the three previous years, and come near those in 1886, when the last traces of the great atmospheric disturbance were still everywhere perceptible. It would seem, then, that some optical disturbance has been really present, the beginning, extent, and cause of which, however, are in obscurity. The desirability of systematic observations in different places is pointed out.

— For the prevention of sea sickness, a curious notion seems to be common that the stomach should be kept as full as possible. Thus have we seen stout old men and women take with praiseworthy persistence — had the result been satisfactory — biscuits, brandy and soda, apples, a pint of porter, a red herring, and various other edibles and potables, says the *Lancet*, with an entire want of success in retaining them, a course of procedure peculiarly trying to those who happen to be standing, or rather lying, on the verge of the act of vomiting. Were we to counsel those who are liable to this affection, we should recommend as follows. Take a moderate meal two hours before going on board. Remain on deck amidships, well protected against cold, as long as possible. As soon as the premonitory symptoms appear, retire to the berth, undress as quickly as possible, and lie flat on the back for the first twelve or even twenty-four hours without food. Then take a small portion of dry bread and roast beef without fluid; this the stomach will probably retain. If there is much movement of the vessel, lie quiet again, or even go upon deck, and in the course of thirty-six or forty-eight hours the system will have recovered itself, and no further trouble will be experienced. It is a mistake to introduce a quantity of fluid, even of strong coffee, into the flaccid stomach, but if sickness persist, a glass of champagne will probably prove serviceable. In some few persons quinine or antipyrin, chloral or potassium bromide, may act well, but as a rule medicine of all kinds should be eschewed by those who do not wish to aggravate what is already hard to bear.

— Caoutchouc, or india-rubber, is produced in Dutch Guiana under different species, the most important of which is "balata" or "milk of the bullet tree," the export of which, says Consul Wyndham of Paramaribo, is attaining considerable proportions, and will, it is believed, be very productive for a time only, as there is no forest conservancy law in the colony. Persons who are granted tracts of land for the gathering of this product are uncontrolled in their method of drawing the milk, which results in trees being totally destroyed to get the greatest amount of milk by the quickest and most inexpensive method. The district where the largest quantity of balata trees are known to exist in the colony is that bordering on the Correntyne River, known in Dutch Guiana as the "Nickerie district." Balata is treated by the manufacturers simply as a superior kind of gutta-percha, and therefore its name disappears when manufactured; nevertheless balata is distinctly different from gutta-percha, and this is manifested in some of its physical characters; for instance, it is somewhat softer at ordinary temperatures and not so rigid in the cold. Besides the bullet tree, there are trees or plants known as the *Tonckpong*, which give a valuable rubber, and again *Bartaballi* and *Bushrope*, to which collectors do not appear to have given a name. The india-rubber balata industry, although carried on in Dutch Guiana in a desultory way for a long time, has never until quite recently assumed sufficient importance to cause the local government to legislate upon it. As yet the law only lays down the regulations under which concessions are granted, and does not deal with the supervision or treatment of the trees, or the method of extracting the milk. Caoutchouc is yielded both by trees and vines. Those already mentioned are, as far as it is known, the principal ones in the colony, and the method of collecting the milk is by cutting down trees, by incisions, and by circling the tree. In each case there is no protective law, and the trees are generally ruined. The chief port of export is Demerara, and as yet no export duty exists, but as the production increases it is expected that it will not escape taxation. Nothing has been done to cultivate the plant, neither does the soil seem to favor its growth except in some peculiar circumstances.

— The comet found by Professor Barnard of the Lick Observatory on Sept. 27 proves to be the long-looked-for Tempel-Swift comet. It was first discovered by Tempel in 1867, and by Swift in 1880. It was not until the latter date that it was settled that a new short-period comet had been added to the list. Mr. Bossart, one of the computors connected with the Paris Observatory, had computed the perturbations from 1880 to date, and had also prepared an ephemeris. The date of perihelion as determined by Mr. Bossart appears about 2.4 days late. With that correction, the following ephemeris has been computed. The epoch is for Berlin, midnight.

1891.	R. A. h. m. s.		Dec. deg. min.
Oct. 30	21 21 13	+	6 19 8
Nov. 1	26 2		7 3.4
" 3	31 17		7 48.9

The following are the positions for Wolf's comet for the next ten days. The epoch is for Greenwich, midnight.

1891.	R. A. h. m. s.		Dec. deg. min.
Nov. 8	4 ?8 30	—	5 59.4
" 9	38 1		6 26.1
" 10	37 32		6 52.2
" 11	37 0		7 17.7
" 12	36 28		7 42.7
" 13	35 55		8 6.9
" 14	35 20		8 30.5
" 15	34 45		8 53.4
" 16	34 8		9 15.7
" 17	33 31		9 37.2
" 18	4 32 53		9 58.1

The comet discovered by Professor Barnard on Oct. 3 is passing very rapidly southward, and can only be seen in the southern hemisphere. An ephemeris for following dates is not at hand.

— Dr. Kirkwood, professor of astronomy in the University of Indiana, has been appointed to lecture on astronomy at Stanford University, California.

— The regents of the University of California have elected Dr. Henry Crew, instructor in physics at Haverford College, as an astronomer at the Lick Observatory.

— It is hinted in the October number of the *Observatory* that Dr. Huid, who has been for many years the superintendent of the English Nautical Almanac, will soon retire from that position.

— Professor Asaph Hall, the eminent astronomer, who has been for many years in charge of the large telescope at the United States Naval Observatory, has been placed on the retired list of the navy.

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LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The International Geological Congress in Washington.

THERE have been numerous unofficial accounts of the late Washington meeting of the Geological Congress, but none has yet appeared in which the attendance and work performed have been compared with those features of the previous congresses.

It will be recalled that at the London session of 1888 the American committee was authorized to invite the Congress to meet in America for its next or fifth session. Austria-Hungary had previously had a quasi promise that the fifth session should be held in Vienna, but her representatives at the London session, Mojsisovics and Stur, gracefully and generously yielded to the invitation from America.

From the official minutes of the meeting of the Council on Wednesday, Sept. 19, we learn that M. Frazer presented, on behalf of many scientific societies and of institutions for higher education, the invitation to meet in the United States in 1891. M. von Zittel, Hauchecorne, Stur, Hunt, Capellini, de Lapparent, and Macfarlane warmly seconded this invitation. The former added that the well-known generosity of Americans would make the visit easy. M. Stur said that the Austro-Hungarian geologists very much desired the congress to be held in Vienna, but after having heard the invitation to meet in the United States he would also support this invitation, in the hope that three years later, or in 1894, the congress would come to Vienna, when he promised them a warm reception. M. Neumayr repeated M. Stur's wish, and hoped that the session of 1894 would be reserved for Vienna.

The last act of the president of the congress, Professor Prestwich, was to declare the session closed and adjourned to Philadelphia in 1891.

Three years is none too long to get the endless details for a meeting of this kind arranged, yet over two years were wasted, and less than twelve available months remained in which to secure the participation of societies and geologists throughout the world, to negotiate special rates of transportation on sea and land, to perfect the plans of visits to mines and distant localities, and, above all, to raise money to entertain the foreign guests in a manner which they have been taught to understand is the American manner. The result may be gathered by an inspection of the following table, which gives the attendance of members from foreign countries as well as from the country in which the session was held for each of the five sessions. It should be noted that there are no official statistics giving the number enrolled separately from the number which attended the first or Paris session. The "N" in the first horizontal line below the name of the city indicates natives of the country where the session was held; the "F" stands for foreigners.

	Paris 1878	Bologna 1881	Berlin 1885	London 1888	Washington 1891
	N. 193 F. 107	N. 150 F. 75	N. 166 F. 97	N. 281 F. 151	N. 148 F. 58
Argentina	–	–	–	1	–
Australia	1	–	–	1	–
Austria-Hungary	5	8	17	10	3
Belgium	14	6	6	15	3
Bulgaria	–	–	–	1	–
Brazil	–	–	1	–	–
Chili	–	–	–	–	1
Canada	3	1	1	3	2
Denmark	1	1	1	–	–
Egypt	–	2	–	–	–
France	193	18	10	17	5
Germany	6	6	166	29	23
Great Britain	3	6	12	281	3
Holland	3	–	2	1	–
India	–	1	–	1	–
Italy	15	150	19	12	–
Mexico	1	–	–	2	3
Norway	2	–	3	2	1
New Zealand	–	–	–	1	–
Portugal	1	2	1	2	–
Peru	–	–	–	–	1
Poland	–	3	–	–	–
Roumania	9	1	1	2	2
Russia	7	6	7	13	8
Sweden	6	1	3	4	4
Switzerland	10	8	3	5	2
Spain	12	4	1	4	–
United States	8	1	9	14	148
Percentage of foreigners	35.66	33.33	36.88	34.80	28 15

It appears from the table, which has been compiled from the official reports of the first four sessions, and from the report of the Washington session published in the *American Geologist*, that the last or American session was distinguished, first, for the smallest aggregate attendance of participants; second, for the smallest number of native participants; third, for the smallest number of foreign participants; fourth, for the smallest proportion of foreign to total participants.

How far the American participants represented the geologists of the country it is difficult to say, but of the six who were accredited to Philadelphia, one was a professor of physics in the University of Pennsylvania, one was a physician and mineral dealer, two were young mining and geological engineers, one was an amateur mineralogist, and the sixth was a professor of geology.

But the difference in the character of this from all previous sessions of the International Geological Congress becomes apparent when we examine the lists of the foreign visitors. Of men like

Capellini, Hauchecorne, Beyrich, Renevier, Vilanova, Delgado, de Lapparent, Dewalque, Torell, and a few others who have been the acknowledged leaders and directors of the congress, and most of whom have attended every session, not one was here. In fact, with the exception of Professors Gaudry, von Zittell, T. M. K. Hughes, Dr. Barrois, and perhaps two or three more, there were no geologists of the first rank from abroad at all. Professor Hauchecorne stated three years ago that he intended to bring twenty or thirty mining students from Germany to visit our anthracite regions, yet the writer is informed that after the arrangements for a visit to the anthracite fields had been completed by others than the Washington committee, no one took advantage of the opportunity.

As to the work done, according to the reporter of the *American Geologist*, "the congress passed off with the simple presentation, largely or entirely, of some American views on American geology, followed by such desultory comment or discussion as happened to spring up."

The "long excursions" may have resulted in much good to the visitors. It is to be hoped that they did, for the subscription price was prohibitive for many foreigners who would have been best able to profit by them.

PERSIFOR FRAZER.

Philadelphia, Pa., Oct. 27.

The Man of the Future.

A READING of the article under the above heading by Dr. Shufeldt (*Science*, Oct. 16) impresses me with the manifold difficulties attending all speculations regarding the future history of the race, as a result of the varying standpoints occupied by the anthropological prophets.

The problem of human progress seems to have a five-fold aspect, physical, material, social, moral, and intellectual; and it therefore involves questions belonging to sciences as widely divergent as physiology, technology, sociology, and psychology.

Upon its first phase Dr. Shufeldt, as a professional biologist, can speak with much more authority than myself. But there is not wanting excellent biological authority for the supposition that a further natural development in this respect is precluded by the artificial conditions which have made man to a large extent independent of those laws whose operation is traceable in all the history of organic evolution. This, of course, does not militate against the probability of changes tending towards his perfect adaptation to the erect posture and the elimination of rudimentary structures, as resulting from the varying conditions of his artificial environment. Although in the sub-human state the environment may have made the man, in the human state the man, generally speaking, makes his environment. The care taken to preserve the sickly, imbecile, and otherwise useless or noxious members of society, is, from this point of view, a powerful anti-progressive factor. The refinements of civilization place man out of the reach of natural selection, and operate to diminish his vital energy, at the same time they promote delicacy of structure. Such practices as tight-lacing and foot-pressing are barbarous customs, tending truly, as Dr. Shufeldt observes, to produce structural modifications, but certainly doomed to extinction at the very next stage of psychological evolution.

The ruling ethical codes not only give rise to an unscientific tenderness, but they operate to prevent sexual selection. The only serious attempt at scientific human stirpiculture was in the Oneida Community; and this has been a failure, partly because of the inevitable triumph of traditional instincts over speculative principles, as soon as the zeal of the experimenters had cooled, and partly because of symptoms of a violent crusade against the experiment by the exponents of the accepted morality. If the government could follow the suggestion made by Professor Lester F. Ward and other savants, and relegate the whole business of the propagation of the species to individuals especially selected for the purpose, a very rapid improvement would naturally take place; but the plan is fraught with collateral difficulties, and, even if these could be overcome, it seems to be forever out of the question, on account of the moral impossibility of obtaining for it, under any conceivable circumstances, the sanction of public opinion.

Dr. Shufeldt's prediction of the abolition of war is open to the criticism that we have no knowledge of any animal whose existence is not accompanied, if not maintained, by warfare and even deliberate slaughter. Progress has thus far tended, not towards peace, but towards periodicity in war. The engines of destruction become daily more deadly, and each war is more costly, both in men and money, than the preceding. Chateaubriand, in his pamphlet "De Bonaparte et des Bourbons," calculated that more lives had been lost during the Napoleonic wars than during the whole of the Middle Ages throughout all Christendom. An argument in favor of war, considered in the abstract, is that its psychological effects are exceedingly good, and that periods of peace are usually periods of moral degradation.

The material progress of the past century has been unquestionably enormous, and as its continuance seems to be assured for all time, it is difficult to set a limit to its possibilities; but this field is a well-worked one, and predictions are superfluous. It must be observed, however, that the problem of aerial navigation seems on the point of being solved, now that it has passed out of the hands of charlatans into those of serious scientific investigators; and if it once becomes an accomplished fact, it will produce such changes in the conditions of human life as to vitiate any speculations which do not take it into account.

The social progress of the world, or even of Christendom, I venture to believe problematical. The principle of political and social equality seems to be directly in the teeth of modern science, which assures us, above all things else, that inequality is not merely an existing fact throughout the whole domain of nature, but that it is the *sine quâ non* of progress. Every new type is created by the accumulation of variations in the old. The differentiation of the patrician classes from the plebian is a continuation of the same process which, according to the evolutionary hypothesis, has differentiated from each other all the diverse forms of animal and vegetable life. The tendency in modern society to obliterate hereditary distinctions is detrimental to progress, for so far as it is carried out it makes impossible the production of any higher human type than the present.

Furthermore, the laws of nature are uniform throughout all realms, and that of specialization of function holds good in sociology as well as in biology. The highest social condition would be one in which every social, industrial, and political function was performed by a distinct class, concentrating upon that function all its energies. It is this principle which alone makes the man structurally superior to the *Amoeba*; and the popular negation of it is an indication that the tide of social development is in its ebb.

This negation is not usually extended to the industrial realm, where specialization of function is the order of the day. But this industrial progress has given rise to grave problems, which cannot be solved in a half-hour.

It is when we come to the psychological aspect of progress that we are confronted with the most serious difficulties, for upon no point is there a greater variance of opinion in the thinking world than upon the lines which true moral, religious, and intellectual progress must follow.

It is even a debatable question whether there can be any moral or religious progress, as it is denied that ethics or religion have any other than a pathological significance. To give them validity, there must be a real object and true mode of worship, and an imperative norm of duty. It would seem, on the one hand, that it is impossible to verify or vindicate scientifically these fundamental postulates; and yet both religion and ethics are so characteristic of the human species as to lead to the suspicion of a psychological atavism wherever they are absent.

Passing by this antinomy, it is evident that if there are any religious and ethical facts, they must be capable of definition, classification, and rational exploitation: in other words, a science may be erected upon them, and a progress in this science must take place parallel to that which every other science is undergoing.

The question of intellectual progress in general is as difficult as that of religion and morals. Such a progress may take two forms; either the accumulation of knowledge, or the development of the faculties of thought and observation. As regards the first, no one

can doubt that the stock of knowledge possessed by the human race at large is rapidly increasing, and will continue to do so. But in the second we meet with several difficulties. If, as Dr. Paul Carus says, metaphysics is "a disease of philosophy" and devoid of value, its decreased influence in the world of thought would seem to indicate a progress of the human mind in the direction of healthy and fruitful activities. But the fact that all science presupposes certain metaphysical concepts,— as that of the trustworthiness of the instinct which attributes objectivity to phenomena cognized by the senses,— would seem to belie the dictum of the great monist; and, as the abstract notions of metaphysics are much farther removed from sub-human psychological conditions than are the concrete ones of natural science, the disuse of metaphysics would appear from an evolutionary standpoint to be, like the atrophy of the religious sense, an indication of retrograde development. Nevertheless, the widely diffused intellectual activity of the present, in which even metaphysics is represented by a greater number of schools than ever before, and which, for the first time in the history of the world, has a broad basis of scientific facts, cannot but tend towards a still higher intellectual condition. One of the most important steps in this direction will surely be a synthesis of the now comparatively isolated departments and schools of human knowledge and thought.

No factor is more promising than the new scientific theories of education; which ought of themselves, when their application has become more general, to develop within a few generations a new and superior type of mind.

No theory about the psychological future of mankind can afford to ignore the strange possibilities opened up by the science of hypnotism. This is a most fruitful field of speculation. We live in a period of esthetic decadence; but neither can esthetic development be left out of account. The esthetic faculty contributes more than any other to individual happiness, and it may be capable of being brought by systematic cultivation to a degree of perfection hitherto unknown.

To sum up, it would seem that there is an undoubted material progress under way, from which wonderful and startling results are to be anticipated, but which will not, unless accompanied by a great intellectual decadence, terminate, as Dr. Shufeldt predicts, in a total destruction of the forests, or, indeed, of any portion of the flora or fauna of the globe which has even a picturesque or decorative value. The wide-spread idea that the development of material resources is all there is of progress, is both an effect and a cause of a temporary tendency to physical, social, and psychological retrogression.

Neither our senses nor our memories are as acute as those of our barbarian ancestors; our taste and capacity for intellectual speculation is not as great as was possessed by our predecessors of the scholastic period, or by the south Asiatic Aryans of any historic time; the ideals of strength and intensity embodied in the Niebelungenlied, those of delicacy and grace which gave rise to the Arthurian legends, and those of divine love and beauty which inspired the Old Masters, have alike become dim and distant to us; and the low vice of avarice rules the day.

But never before was the sum of human knowledge so vast; never were all questions, physical, social, and psychological, studied so carefully and in so full a light; never was the importance of education, and of right education, so generally recognized and insisted upon; and never has the race seemed so near to that fusion into one great world-nation which is indispensable to a universal distribution of the knowledge and ideas and materials which are now of but local utility.

The tendency of the times is to subordinate man to civilization; but civilization is useless except in so far as it promotes the happiness or personal development of man. If any real improvement is to be accomplished in the race itself, in contradistinction to its material environment, there will evidently be necessary a systematic encouragement of that salutary inequality by which favorable variations are husbanded and a specialization of function in the social organism secured.

I cannot venture, in view of the complexity of the problem, to hazard a prediction even for the next stages of human evolution, to say nothing of the millions of years over which Dr. Shufeldt so gaily gambols. His very dramatic picture of the last man can, however, never be realized in fact unless the expected modification in the human organism shall amount to a radical transformation. It is inconceivable that man should be the last of all living forms to disappear during the process of the earth's cooling. As at present constituted, he would succumb, even with all the appliances of civilization, long before many of the lower species. Most of the latter could, in no supposition, be exterminated by him, and many of them, as the doctor well knows, possess incredible powers of resistance to unfavorable climatic and other conditions.

Speculations regarding so very remote a future are of doubtful utility, especially in view of the daily possibility of one of those celestial casualties familiar to astronomers, such as a collision with a dead sun. I forbear to picture the sublime horrors of such an event, but they may at any moment be realized, though with such rapidity that before any human mind could guess the truth the whole solar system would have been dissolved, by the heat resulting from the impact, into invisible vapor.

MERWIN MARIE SNELL.

Washington, D.C., Oct. 26.

Government Science.

THE communication of Eugene Murray Aaron in the issue of *Science* for Oct. 23, under the above heading, contains statements and presents conclusions which I believe to be well founded. Like that writer, I am warmly in favor of the recent reforms in the methods of filling vacancies in the various departments of the civil service, in positions where technical and scientific knowledge is not required. But I am firmly of the opinion that if the heads of scientific bureaus were allowed to select their assistants, subject of course to the approval of the Civil Service Commission, far better results would be secured.

An instance was recently reported to me similar to the case cited by Mr. Aaron. A Washington daily contained the announcement of a vacancy in a subordinate position requiring special scientific attainment. A few young men, hanging around Washington for something to turn up, saw the advertisement as soon as it appeared, and at once placed themselves under instruction to "cram" for the examination. The one of their number who showed the highest average secured the position.

A man far more competent to fill it, residing many miles from Washington, was urged by friends to make application. His letter of inquiry was received too late, and thus a tyro was appointed when an expert might have been secured, to the expressed disgust of eminent scientists in government employ. C.

Highlands, N.C., Oct. 30.

Words of Algonkian Origin.

The Chinook jargon, that *lingua franca* of the region of the Columbia, has recruited its vocabulary from many different sources. Amongst others the Algonkian tongues have contributed their share towards the formation of this linguistic mosaic.

In the "Partial Vocabulary of the Chinook Jargon," given in 1863, by Theodore Winthrop (Canoe and Saddle, Boston, 1863. New ed., Peterson, Edinburgh, 1883, pp. 211–214), we find the following words of Algonkian origin:

Kinni-kinnik, = smoking-weed,
Tatoosh, = milk, cheese, butter.
Wapato, = potato.

The word *moos-moos*, "beef," "cattle," which also occurs, is probably not Algonkian. It occurs in a vocabulary of the "Chenook" of Fort Vancouver, and the "Calapooa," collected before the year 1840, by the Rev. Samuel Parker (see Journal of an Exploring Tour beyond the Rocky Mountains, Ithaca, 1840, pp. 393, 398).

George Gibbs, in his "Dictionary of the Chinook Jargon, or Trade Language of Oregon" (Smithson. Miscell. Coll. 161, Washington, 1863. pp. xiv., 44), attributes a Cree origin to two, and a Chippeway origin to one, of the 490 words of which the jargon was then composed. These words, regarding which he observes: "The introduction of the Cree and Chippeway words is of course

due to the Canadians" (p. viii.), are as follows: "*Mit-ass, n.* Cree, Mitas (Anderson). Leggings. A word imported by the Canadian French (p. 17). *Sis'-ki-you, n.* Cree (Anderson). A bob-tailed horse (p. 23). *Totoosh*, or *Tatoosh, n.* Chippeway, totosh (Schoolcraft). The breasts of a female, milk. *Totoosh lakles* [*la graisse*], butter."

The other words, the second of which is clearly Algonkian, Gibbs thus describes: "*Moos-moos n.* Klikatat *músmus;* Chinook, *emúsmus.* Buffalo, horned cattle. The word, slightly varied, is common to several languages. Mr. Anderson derives it from the Cree word *moostoos*, a buffalo, and supposes it to have been imported by the Canadians; but Father Pandosy makes *músmus* Yakama" (p. 17). "*Wap pa-too, n.* Quære, *u. d.* The root of the *Sagittaria sagittifolia*, which forms an article of food; the potato. The word is neither Chinook nor Chihalis, but is everywhere in common use" p. 28). "*Le-pish'-e-mo, n.* Quære, *u. d.* The saddle-blanket and housings" (p. 15).

The last of the above three words is most likely of mixed French and Algonkian etymology.

In the "Manual of the Oregon Trade Language, or Chinook Jargon," published by Mr. Horatio Hale in 1890, the following words occur without their Algonkian origin being indicated:

Lepishemo (lipishímo), saddle housing (p. 47).
Mitass, J [argon] (mitás), leggings (p. 48).
Totoosh, J [argon] (totúsh), breast, udder, milk (p. 52).

And the English-Chinook vocabulary yields the following, of which the origin is likewise not noted:

Breasts, *totoosh* (p. 54).
Butter, *totoosh lakles* (*la graisse*, Fr.), p. 23.
Leggings, *mitass* (p. 57).
Milk, *totoosh* (p. 58).
Potato, *wappatoo* (p. 59).

The word *moosmoos* also finds place in Professor Hale's vocabulary, with the meanings "buffalo, cattle, ox," and is set down as [Chinook] (p. 48). The words of Algonkian origin which are to be found in the vocabulary of Chinook, as given by the above authorities, are consequently: *Kinni-kinnik*, [*le*] *pishemo, mitass, siskiyou, totoosh, wappatoo.*

Regarding the etymology of these loan-words, the following may be said:

Kinni-kinnik. Derived directly or indirectly from Otcipwē. The cognates are Otcipwē (Baraga) kiniginige, "I am mixing together something of different kinds." (Cuoq) *kinikinige*, "mêler ensemble des choses de nature différente." The radical is seen in Algonkin (Cuoq) kinika, "pêle-mêle" = Cree *kiyekaw.*

Lepishimo. This word evidently consists of the French article *le* and a radical [*a*]*pishemo.* This latter corresponds to the Otcipwē (Baraga) *apishamon*, "anything to lie on; a bed; *apishemo*, "I am lying on something." Compare the western Americanism *apishamore*, which Bartlett (Dict. of Americanisms, 1877) thus defines: "*Apishamore* (Chippewa, *apishamon*). Anything to lie down on; a bed. A saddle-blanket made of buffalo-calf skins, much used on the prairies."

Mitass. Directly or indirectly (through French-Canadian) from Otcipwē or Cree. The cognate words are: Otcipwē (Baraga), *midâss;* Algonkin (Cuoq), *mitas;* Cree (Lacombe), *mitâs.* The word exists in Canadian-French in the form *mitasse.* Dr. Franz Boas kindly informs me that "legging" in Chinook and Clatsop is *imētas.*

Siskiyou. Though this word is assigned a Cree origin by Mr. Gibbs, its etymology is very uncertain. Blackfoot *sakhsíu*, "short," and Cree *kiskikkuttew*, "he cuts in two," offer themselves for comparison, but with no certainty.

Tatoosh, totoosh. From Cree or Otcipwē. The cognate words are: Cree (Lacombe), *totosim*, "mammelle, pis;" Otcipwē (Baraga), *totosh*, "breast, dug, udder;" Alkonkin (Cuoq), *totoc*, "mammelle."

Wappato, wappatoo. From Cree or Otcipwē. The cognate words are: Cree (Lacombe) *wâpatow*, "champignon blanc;" Otcipwē (Baraga), *wâbado*, "rhubarb;" Algonkin (Cuoq) *wabato*, "rhubarbe du Canada." It is in all probability a derivative from the root *wap-*(*wab-*), "white."

Another word may be added to the list, viz., *pāpūs* (*papoose*) = child. This word is used by the speakers of Chinook in eastern British Columbia. The Algonkin origin of the word has been disputed by some, but there is every reason to believe that it is connected with the root seen in the Massachusetts *papeississu* (Eliot) = "he is very small;" *peisses* (Eliot), "child;" *pe-u* (Eliot), "it is small." From this root there seems little doubt that the word *papoos* or *papoose* found in Roger Williams, and in Wood ("New Engl. Prospect"), has been derived, as Dr. Trumbull points out.

It might be remarked that the words *kinni-kinnik, lepishemo, mitas, totoosh, wapato*, and *papoose* were all heard by the writer in western British Columbia in the summer of the present year, so they are still in use as part of the jargon. The word *siskiyou* was not heard and is probably obsolescent.

It is a remarkable and an interesting fact that the Algonkian family of languages has borne its part in the formation of the curious jargon of the Pacific coast of North America. The presence there of these words is due in part to isolated Otcipwēs and Crees who have crossed the Rockies, and to the French-Canadian half-breeds in whose language these words are also to be found.

A. F. CHAMBERLAIN.

Worcester, Mass., Oct. 24.

Auroral Phenomena.

ON Sept. 9 there was seen at Lyons, N.Y., a band of light narrower than the Milky Way, arising from the western horizon and passing nearly vertically through the constellations of the Northern Crown and Lyre, just south of the zenith, and thence downward at times to the eastern horizon. There was an aurora at the time in the northern sky, but this band maintained its position throughout the evening entirely independent of the display, although varying somewhat in brightness in sympathy with the aurora and evidently being itself of an auroral nature. On Sept. 10 and 11 an aurora was visible in Great Britain, and, as appears from descriptions in *Nature* for Sept. 17 (p. 475) and Sept. 24 (p. 494), a band of light similar to that which constituted such a remarkable feature in the display at Lyons was likewise seen in that locality also. Other instances have been noted by the writer in which some peculiarity of form or color has attended an outbreak of the aurora on both sides of the Atlantic.

There is this evening in the western sky a magnificent display of red light similar to the sunset glows which attracted so much attention a few years since. Three-quarters of an hour after sunset the entire western heavens are lurid red, resembling the reflection from a conflagration.

M. A. VEEDER.

Lyons, N.Y., Oct. 29.

Chautauqua and other Iroquois Names.

MR. ALBERT S. GATSCHET has kindly sent me his paper on the "Origin of the Name Chautauqua," of which he says, "All the information above was obtained from J. N. B. Hewitt, in Washington, D.C.," but I may be permitted to add a few words on this and other names. I may premise that I have a list of about 1,200 Indian names of places in New York, about half of which are either obsolete, or applied to places little known. Many local names can be obtained of the Indians on any reservation.

First, of pronunciation, in which Mr. Gatschet's informant differs from other authorities. It is a little too positive to say that "To spell it 'Chatakwa' would conform better to scientific orthography, for the first two syllables are both pronounced short." Having but accidentally used the name in conversation with my Onondaga friends, it is of little importance to say that they gave it the usual pronunciation, for I was simply trying to get its meaning. Others, who have given it attention, are quite decided on this point. Mr. O. H. Marshall was an acknowledged authority on local Indian names. In his "De Celoron's Expedition to the Ohio," he gives several forms. Among these, Alden wrote it as pronounced by the Seneca chief Cornplanter, "Chaud-daukwa." Mr. Marshall adds, "It is a Seneca name, and in the orthography of that nation, according to the system of the late Rev. Asher Wright, long a missionary among them, and a fluent speaker of their language, it would be written 'Jah-dah-gwah,' the first two vowels being long, and the last short." Mr. L. H.

Morgan gives the name in all but the Oneida dialect, and with but slight variation. In all he makes *a* sound as in far. The French spelling would prove but little, but Sir William Johnson wrote it "Jadaghque," and thus it appears on Lake Erie, on the boundary map of 1768.

Mr. Marshall took notice of the various meanings ascribed to the name, as "The place where a child was swept away by the waves;" "the foggy place;" "the elevated place;" "the sack tied in the middle;" but preferred the one given him by "Dr. Peter Wilson, an educated Seneca." This was "where the fish was taken out;" agreeing with the meaning furnished Mr. Gatschet. As Mr. Marshall's paper is not accessible to all, I copy the tradition, which is very simple, as given by Dr. Wilson. "A party of Senecas were returning from the Ohio to Lake Erie. While paddling through Chautauqua Lake, one of them caught a strange fish and tossed it into his canoe. After passing the portage into Lake Erie they found the fish still alive, and threw it in the water. From that time the new species became abundant in Lake Erie, where one was never known before. Hence, they called the place where it was caught Jah dah-gwah, the elements of which are Ga-joh, 'fish,' and Ga-dah-gwah, 'taken out.' By dropping the prefixes, according to Seneca custom, the compound name 'Jah-dah-gwah' was formed."

Mr. Gatschet simply reverses this story, taking the fish from Lake Erie. On the other hand, we have another careful writer, Mr. Morgan, interpreting the name as the "Place where one was lost."

From various old documents it is evident that the name was applied to the lake and also to the nearest spot on Lake Erie. It first appears in De Celoron's journey, but was evidently in use before. A lead plate, which the Indians purloined from him, was marked by mistake to be placed at the confluence of the Ohio and the Tchadakoin, July 29, 1749. In the one buried, this was corrected to the confluence of the Ohio and Kanaaiagon, now the Conewango. De Celoron reached the Chatakouin portage July 16, 1749, "and arrived at the end of the portage, on the banks of Lake Chatacoin, on the 22d."

It is quite probable that the portage terminating at Chautauqua Lake on the one hand, gave the name to the landing on Lake Erie on the other, according to Indian custom. This spot is often referred to about that time. Stephen Coffen, in 1753, being then with a body of French, "arrived at Chadakoin on Lake Erie, where they were ordered to fell timber, and prepare it for building a fort there." M. Morang liked the place no better than De Celoron had done, "the river of Chadakoins being too shallow to carry any craft with provisions, etc., to Belle Rivier." M. Mercie found another place at Erie, "fifteen leagues to the south-west of Chadakoin." Others used similar terms. On his map of 1758, M. Pouchot applies the name to the Conewango, calling the stream flowing from the lake the River Shatacoin. He seems singular in this, as Chautauqua Creek had been thus called but a few years before.

Mr. Gatschet explains the use of the prefix T'ka, much as Morgan does. The latter, however, invariably gives the full sound, Tecar, or Teka, instead of the shortened, which is customary. In first taking down names from the Onondagas I did the same, being anxious to have every syllable fully pronounced, but soon found that this did not give the word sound. In this case that is best preserved by T'kah, which I have long used.

The discrepancy in the translation of Indian words is at first surprising, but many are purely the fancies of white men, and these are as persistent as any. Thus, in a familiar instance, Skaneateles, which means "long lake," is pertinaciously rendered "beautiful squaw." Cayuga is an instance where the Indians themselves do not agree, for it was translated "at the mucky land" for Mr. Morgan. David Cusick says it means "mountain rising from water," while Albert Cusick translated it for me as "where they drew their boats out of the water." I am inclined to think this difference may be more apparent than real, all possibly referring merely to an incident in the Hiawatha legend.

Indian names in New York come from very trivial things, and probably always have. Honcoye, "a finger lying," is a case in oint. The amputated member, lying in the way, was a matter of comment or description, and affixed itself to the village more than the place. Once the name of a town it migrated with the town. The favorite village name of Ka-no-wa-lo-hale, "head on a pole," was used in more than one place at the same time.

I have noted one curious thing in Indian pronunciation, that they do not always pronounce names among themselves as they do to the whites, so that error is often perpetuated on the best of authority. An Onondaga never pronounces the name of his nation in conversation among the whites as he does among his own people, but invariably gives *a* the long instead of broad sound, which he always uses in his own language in this word. I do not know how this commenced, but it was long ago, and may have come from early attempts to conform to supposed rules among us. It is a curious fact, however, and shows the need of care in taking down words.

Among the sonorous names preserved in New York, very few are poetical, and where they are made such, with rare exceptions, their correctness may be suspected. They are seldom unaltered, letters being changed or syllables dropped. In a large proportion of cases they are rendered in the Mohawk dialect west of Albany, as that people was most directly in contact with the colonists. Thus we frequently find Mohawk pronunciation in the territory of the Onondagas and Senecas

As in the case of Chautauqua, names are often taken from one place and applied to another. Schenectady, "Beyond the pines," is an instance. It belongs to Albany, but became expressive when used in either way. When Corlaer bought Schenectady the Indians knew it as Schonowe, 'the great plain." The name of Onondaga followed the various removals of the village, and this is true of most of the Seneca towns. As with us, the same names would co-exist. The Oneidas had, among their lakes, Skaniadoris; the Onondagas, Skaneateles; the Senecas, Skaneatice; all meaning a long lake, but not necessarily large. The allusions to hemlocks, in the same way, are quite frequent.

One cause of confusion in the interpretation of names is the similarity of sound. The name of Canastota is probably rendered correctly Kanetota, "a pine tree standing alone;" but the Onondagas know it as Kanosta, "the frame of a house," which they greatly admired when the first one was built there. A facetious friend has suggested a Latin derivation from *canis totus*, the whole dog, which would do quite as well as many interpretations of Indian names. Occasionally one meets with a name strongly suggestive of European origin. Two of these are quite noteworthy. One is that of Tappan, a well known personal name with us, but also that of an early Indian tribe, living on Tappan Bay, on the Hudson River. Of this Heckwelder long ago wrote, "This is from the Delaware language, and derived from Thuphane, or Tup-han-ne, 'Cold Spring.'" The other is the name Seneca, which appears on Dutch maps as early as 1614. The Dutch knew the Iroquois only as the Mohawks and Senecas, and used the names by which the Algonquin tribes called them. Both divisions had strong cannibal tastes, and for this were held in abhorrence by other nations. The Mohawks were known in New England as "men-eaters," and the name of the Senecas seems to have had much the same meaning elsewhere. Of course it is no more an Iroquois word than Maqua or Mohawk. It may come from the radical word *sinni*, "eat," and probably does.

Niagara has no allusion to the falls, but is simply a "neck," suggested by its connecting two great lakes. It takes many forms, and the Neutrals called it On-gui-a-ah-ra in 1640, having a village there of the same name. As the name of Erie means a cat, I had some doubt, for a time, whether Cusick's translation of another name of Lake Erie, Kau-ha-gwa-rah-ka, "a cap," might not be a misprint, but it is correct. There were several names, of course, for that lake. The Onondagas know Lake Ontario as the lake at Oswego, but in the middle of the last century they called Lake Erie Sa-hi-qua-ge, which the English rendered Swee-ge. The carrying place at Niagara was then known as Och-swee-ge. Oswego river first appears by this name in 1670, with French spelling, and where the present Seneca River leaves Cayuga lake. Father Raffeix said, "The river Choueguen, which rises in this lake, soon branches into several canals." The French sometimes prefixed the letter *O*, but their pronunciation

must be allowed for in all Indian words we have from them. The English usually called the Oneida and Oswego Rivers the Onondaga. In a similar way Genesee River was often termed the Seneca.

These notes need not be carried further, for it is my present purpose merely to direct attention to a few points. Examination will show that large numbers of Indian names are still in use, but with no better meanings than our own.

W. M. BEAUCHAMP.

Baldwinsville, N.Y., Oct. 31.

Battles and Rain.

IN *Science* for Oct. 16 I quoted the only part I had then seen of the now rather famous reference by Plutarch to the occurrence of rain after great battles, and I then considered it as having the meaning commonly ascribed to it. Mr. Powers, however, now tries to show that the commonly accepted meaning is erroneous, and supports himself by the original passage. It seems to me that the ordinary view is correct, and that Mr. Powers, by omitting a portion and by an incorrect interpretation of the passage, has been misled. I will give the passage as translated by Langhorne, italics, punctuation, and all.

"From these writers [historians] we learn, that the Massilians walled in their vineyards with the bones they found in the field; and that the rain which fell the winter following, soaking in the moisture of the putrefied bodies, the ground was so enriched by it, that it produced the next season, a prodigious crop. Thus the opinion of Archilochus is confirmed, that *fields are fattened* with blood. It is observed, indeed, that extraordinary rains generally fall after great battles; whether it be that some deity chooses to wash and purify the earth with water from above, or whether the blood and corruption, by the moist and heavy vapors they emit, thicken the air, which is liable to be altered by the smallest cause." Dryden's translation begins this last statement as follows: "It is an observation, also, that extraordinary rains pretty generally fall after great battles," etc.

It will be seen at once that the last part of this statement by Plutarch has a very different meaning from the first. It would be a remarkable climate that would permit the blood to remain on the earth, or thicken the air with moist and heavy vapors, six months more or less. The extraordinary rains referred to must have occurred very soon after the battle. These served to soak the corruption (which would begin in a very few hours in that climate) and the blood into the surface soil, and thus tended to purify the surface, as Plutarch says. The rains of the subsequent winter carried this material still deeper, and enriched the crops. Plutarch does not connect the two rains together, but rather carefully separates them by the clause referring to Archilochus. The rains of the winter following were evidently gentle, long-continued, and crop producing, and not like the earlier extraordinary rains immediately after the battle and lasting, probably, a few hours only. It would seem as though a good understanding of this earlier view may help prove the falsity of the later regarding explosions and rain.

H. A. HAZEN.

Washington, D.C., Nov. 3.

BOOK-REVIEWS.

Christopher Columbus and how he received and imparted the Spirit of Discovery. By JUSTIN WINSOR. New York, Houghton, Mifflin, & Co. 8°. $4.

NOW that the fourth centenary of the discovery of America is close at hand, books relating to that event, and to the man who brought it to pass, are likely to be abundant. We doubt, however, if any of the rest of them will equal in interest and importance this work of Mr. Winsor. It is written in the spirit and with the methods of the best historical criticism, and with a sincere endeavor to discover and state the real truth. On the one hand, it presents the significance and results of Columbus's work in a clear and impressive light, while on the other it endeavors to set forth with historical fidelity the lineaments of his character. Its literary merits, too, are considerable, the style being strong and incisive, yet at the same time clear and easy flowing. The opening chapters, which treat of the documentary sources from which the life of Columbus has to be learned, are somewhat too technical for the ordinary reader, and similar passages occur in some other parts; but the narrative portions of the book are as interesting as they are instructive. We need not dwell, however, on these features of the book, as the events of Columbus's life are too well known to need recapitulating here, and Mr. Winsor does not profess to have discovered any new sources of information. He has simply followed the original authorities, so far as these are now available; and the merit of his work lies in the fidelity and skill with which he sifts his authorities and interprets the facts.

The first thing that we wish to know about any prominent historic character is the nature and significance of his life work and its effect upon the world. In the case of Columbus the significance of his work was far different from what he himself supposed, and its ultimate results such as he never dreamed of; yet he was none the less the master spirit in the work of discovery, and is entitled to all the honor which that distinction can give him. How great and far-reaching the results of his work were is clearly set forth by Mr. Winsor, especially in his appendix, in which he traces the history of succeeding discoveries down almost to the present day. He shows, as others have shown, that Columbus's ideas about the sphericity of the earth and the possibility of reaching Asia by the west were derived from earlier thinkers, and adds, "There was simply needed a man with courage and constancy in his convictions, so that the theory could be demonstrated. This age produced him." Mr. Winsor makes little account of the alleged discovery of America by the Norsemen, though he does not deny the possibility of such discovery; but he thinks that the story of their voyages could have had no influence on Columbus, and was in all probability unknown to him. In connection with his account of Columbus's voyages and those of his contemporaries, and also in recounting the discoveries since his day, Mr. Winsor lays before us a great number of ancient maps, in which the growth of geographical knowledge can be clearly traced. Indeed, his treatment of the scientific aspects of his subject is as full as could be desired.

But the feature of his book that will excite the most interest is his estimate of Columbus's character, which is emphatically iconoclastic. He evinces no spirit of hostility to the great navigator, though he has some some sarcastic remarks about Irving, De Lorgues, and other biographers; but he shows by well attested facts that Columbus was far from possessing the nobleness of character that has usually been attributed to him. He says very truly that a man like Columbus ought to be judged by a high moral standard — the standard of all ages; but that when so tried the great discoverer is found wanting. The principal charge brought against him is that he originated and persistently followed the practice of enslaving the native Americans and of selling them as slaves in the markets of Spain, thereby becoming the originator of American slavery. This accusation, though by no means new, is supported in this book by overwhelming evidence, so that it is hard to see how any fair-minded man can deny or palliate it; and it throws a very dark shadow over the fame of Columbus. Mr. Winsor also charges him with deceit, cupidity and arrogance, and there is, unfortunately, great difficulty in rebutting these charges. His final judgment on the man who discovered the New World is as follows: "Its discoverer might have been its father; he proved to be its despoiler. He might have given its young days such a benignity as the world likes to associate with a maker; he left it a legacy of devastation and crime. He might have been an unselfish promoter of geographical science; he proved a rabid seeker for gold and a viceroyalty. He might have won converts to the fold of Christ by the kindness of his spirit; he gained the execrations of the good angels" (p. 512).

The world is so accustomed to the opposite view of Columbus's character that many readers will reject the portrait that Mr. Winsor has drawn of him; but we incline to think that it is the one that will eventually be accepted by impartial minds. In any case Mr. Winsor's narrative and arguments are worthy of all attention, and we heartily commend his book to our readers.

AMONG THE PUBLISHERS.

IN the *New England Magazine* for November, C. S. Plumb writes of "A Future Agriculture."

— Dr. Wyatt's work on "The Phosphates of America" is announced as in preparation by the Scientific Publishing Company of this city.

— The *Review of Reviews* seems to have come to the aid of the Society for Psychical Research. It is about to publish, in an early number, a batch of modern ghost stories as a sort of contribution to a "census of hallucinations."

— D. C. Heath & Co., Boston, will issue shortly a beginner's book in Old English (Anglo-Saxon), by George Hempl, professor of English in the University of Michigan. It will consist of elementary grammar and easy texts suitable as introductory to advanced grammar and reading, though sufficient for the usual course in Old English in colleges that give but one course, and in high schools.

— President F. A. Walker's standard works on "Money" and on "Wages" are attracting much attention in England, whither several editions have been sent and where reference to them in the university extension circulars is frequent. The demand for a popular edition in this country and in England will shortly be met by Messrs. Henry Holt & Co., who will issue the two works at a lower price than heretofore.

— The November number of *Babyhood* closes its seventh volume. It contains an article on "The Family Medicine Chest," by the medical editor, which gives instructions as to what ought to be kept on hand in every household for use in an emergency. At the same time the writer points out the dangers of indiscriminate domestic doctoring. Other medical articles of interest to mothers are "The Care of Delicate Infants" and "Bathing for Sick Children." The "Nursery Table" tells how to prepare palatable nursery dishes, and the "Nursery Helps and Novelties" and "Nursery Problems" furnish useful hints and advice concerning the many perplexing questions which parents of young children have to solve. In the "Parliament" the mothers discuss the habit of eating "between meals," the homesickness of children, the baby's photograph, the influence of Punch and Judy on children, etc.

— In the *Educational Review* for November President Hyde of Bowdoin points out what is to be the policy of the small college, now that great universities have been developed. Dr. William H. Maxwell has a paper on the "Literature of Education." Miss Annie Tolman Smith describes the provisions made in Europe for the pensioning of superannuated teachers, and suggests the inauguration of a similar policy here. Professor William B. Smith of the University of Missouri in an article entitled "Twelve *versus* Ten," argues for the overthrow of the decimal system of numeration. The discussions on city school supervision and practice teaching

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Publications received at Editor's Office,

Oct. 21–Nov. 3.

BOLLES, F. Land of the Lingering Snow. Boston, Houghton, Mifflin. 234 p. 12°. $1.25.

CIRCULAR System, The. Organ of the Circular System of Science. Vol. I. No. 1. *m.* Oakland, Cal., W. W. Felts. 8 p. f°. $1 per year.

HELLYER, S. S. Principles and Practice of Plumbing. New York, Macmillan. 294 p. 12°. $1 25.

LOCK, J. B. Mechanics for Beginners. Part I. Dynamics and Statics. New York, Macmillan. 264 p. 12°.

MASSACHUSETTS, Twenty-second Annual Report of the State Board of Health of. 588 p. 8°.

"STYX," of the H. B. of L. Hermetic Philosophy. Vol. II. Philadelphia, Lippincott. 310 p. 12°. $1 50.

THOMPSON, E. P. How to Make Inventions. New York, Van Nostrand. 161 p. 8°.

WEBB, H. L. A Practical Guide to the Testing of Insulated Wires and Cables. New York, Van Nostrand. 118 p. 12°. $1.

WEED, C. M. Insects and Insecticles. The Author, Hanover, N. H. 281 p. 8°.

WINSOR, Justin, Christopher Columbus, and how he received and imparted the Spirit of Discovery. Boston, Houghton, Mifflin & Co. 8°. $4.

WOOD, H. T. Light, an Elementary Treatise. New York, Macmillan. 143 p. 12°. 75 cents.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

For Sale or Exchange for books a complete private chemical laboratory outfit. Includes large Becker balance (200g. to 1-10mg.), platinum dishes and crucibles, agate motors, glass-blowing apparatus, etc. For sale in part or whole. Also complete file of *Silliman's Journal* 1862–1885 (62-71 bound); Smithsonian Reports, 1854-1883; U. S. Coast Survey, 1854-1869. Full particulars to enquirers. F. GARDINER, JR., Pomfret, Conn.

For exchange or sale at a sacrifice, an elaborate microscope outfit. Bullock stand; monocular objectives, one-sixth homeogeneous immersion, four-tenths, and three inch, Bausch & Lomb, also one-fourth and one inch Spencer. Four eye-pieces. Objectives are the best made. Address Mrs. Marion Smith, 41 Branch Street, Lowell, Mass.

For sale or exchange, extra fine pair (♂ and ♀) of skins of Rocky Mountain Goat, with the skulls, etc., as needed for mounting; collection of vertebrate fossils from the Coup Fork Tertiary of Kansas; collection of works on descriptive cryptogamic botany—mostly on *Fungi;* thirteen vols. of *Botanical Gazette*, eight vols. *Grevillea*, four vols. *Notarisea;* stereopticon outfit, with attachment for microscopic projection; 143 stereopticon slides, illustrating zoology and cryptogams. Wanted—American and foreign works and pamphlets on Vertebrate Palæontology, and series of *Am. Jour. of Science* and other periodicals containing contributions to Vertebrate Palæontology. Prof. F. W. Cragin, Colorado Springs, Colo.

are continued by Superintendent Greenwood of Kansas City and Chancellor W. H. Payne of Nashville, Tenn. There are also articles on "Women as Teachers," "Recent Changes in the Regents Examinations in New York," "The New School Law for St Paul, Minn.," the "Socratic Method of Teaching," and the "Educated Proletariat of Germany." The book-reviews are by Professor Woodrow Wilson of Princeton, Professor A. B. Hart of Harvard, Professor F. H. Giddings of Bryn Mawr, President C. F. Thwing of Western Reserve University, Professor Henry C. Johnson of Philadelphia, and the editors.

— After years of labor by the editor, John Foster Kirk, and his assistants, the supplement to "Allibone's Dictionary of English Literature and British and American Authors" is announced by J. B. Lippincott Company as now completed, thus extending and bringing down to the latest practicable date one of the great literary enterprises of the century. Begun in 1850, and for the most part written in the few following years, the three original volumes of Dr. Allibone's work of necessity fail to contain an account of a vast number of books that have of late been published. To supply this deficiency and thus present in a single series of volumes a complete bibliography of English literature from the earliest times to the present (as nearly as possible) has been the aim of the publishers in issuing this supplementary section of the work. Altogether, 37,183 authors, with their works (93,780 in number), are recorded in the supplement, with frequent biographical and bibliographical notices, the latter embracing in many instances criticisms of the works mentioned, from the leading reviews of the day.

— In the *Atlantic Monthly* for November S. E. Winbolt's paper, "The Schools at Oxford," is an account of the work and the examinations that are necessary for a degree from the university. The paper is particularly interesting as showing the difference in the manner of attaining a degree in the English and American universities.